

**THE SOVIET PROGRAM FOR MEDICAL RESEARCH, 1956-1960. A BRIEF  
AND CRITICAL REVIEW OF "THE RESEARCH PLAN OF THE  
ACADEMY OF MEDICAL SCIENCES U.S.S.R., 1956-60"\*\*\*†**

At the 20th Congress of the Communist party of the Soviet Union, held in Moscow in February, 1956, the sixth five-year plan was presented and accepted. Such plans extend into all walks of life in the U.S.S.R. but particularly in fields of applied science, not the least of which has been the program for work in the medical sciences. This pattern is characteristic of the Soviet Union, and one can more or less count upon the fact that professional, business, and academic activities are supposed to be done, *according to plan*, the basic plans being redrawn every five years.

In the field of medical research such programs are implemented in Russia today under a highly organized system within a large number of research institutes, the staffs of which vary in size approximately from one hundred to one thousand individuals, of whom about one-third are of professional rank. There are three hundred of these institutes in the Soviet Union with great centralization in Moscow, Leningrad, and Kiev. They operate under three administrative systems: (1) the Academy of Medical Sciences, U.S.S.R.; (2) the Ministry of Health, U.S.S.R.; and (3) the Constituent Republics of the Soviet Union. The Academy institutes accentuate *basic* research, the Ministry emphasizes *practical or applied* research, including the production of vaccines and other biological materials, while the institutes under the republics are primarily concerned with *local* problems.

The current (1956-60) plan of the Academy of Medical Sciences, U.S.S.R.,‡ which is the subject of the present review, is concerned primarily with what Soviet scientists and physicians would regard as *basic* and *practical* research work to be accomplished during the next five years. From it one can deduce those subjects which they consider to be the most impor-

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\*\* Problemnyy plan nauchnykh issledovaniy Akademii Meditsinskikh Nauk SSSR na 1956-60 gody, Moscow. Pages 3-111.

† The author was a participant in a Medical Mission to the Soviet Union carried out under the auspices of the U.S. Department of Health, Education, and Welfare, during February and March of 1956.

‡ In the drawing up of this plan the Academy of Medical Sciences has had the collaboration of the Medical Research Council of the Ministry of Health and probably other agencies.

tant. In this impressive document, of which the English translation is some 125 pages in length, 22 subjects have been listed, some of them very general, some specific. But they are all to be attacked with vigor during the next five years, and it is emphasized at the start that it is the duty of every scholar of the Academy and every citizen to fulfill this five-year plan in complete accordance with the resolutions of the 20th congress of the Communist party in order to reach the great goals of Soviet medical science as well as to meet the requirements of health protection throughout the U.S.S.R.

**LIST OF PROBLEMS FOR SCIENTIFIC RESEARCH BY THE ACADEMY OF  
MEDICAL SCIENCES, USSR, FOR 1956-1960**

1. Physiology and pathology of higher nervous activity.
2. Basic mechanisms of the activity of the nervous system and their rôle in regulating the functions of the organism.
3. Mechanism for regulating metabolism, the functions of proteins, and their structure.
4. Mechanisms of action of pharmaceutical substances, and the search for new pharmacological and chemotherapeutic materials.
5. Morphology of tissues.
6. Principles of the prophylaxis and treatment of hypertensive disease, arteriosclerosis, and coronary insufficiency.
7. Surgery of the lungs, heart, and large blood vessels.
8. Surgery of the nervous system.
9. Pathogenesis, prophylaxis, and treatment of basic diseases of the nervous system.
10. Malignant tumors.
11. Etiology, prophylaxis, and treatment of tuberculosis.
12. Epidemiology, prophylaxis, and treatment of intestinal infections, particularly dysentery.
13. The protection of the health of women, mothers, and newborn children.
14. Etiology, epidemiology, prophylaxis and treatment of acute infections of childhood (scarlet fever, measles, whooping cough, and diphtheria).
15. The physiological basis of rational nutrition for healthy and ill persons.
16. The hygiene of working conditions and the prophylaxis of occupational diseases.
17. The hygiene of urban or crowded communities.
18. Laws of the variability of microbes and their importance in biology and medicine.
19. Etiology, epidemiology, and immunology of viral infections, particularly influenza.
20. New antibiotics and synthetic chemotherapeutic agents.
21. Epidemic poliomyelitis.
22. Pediatrics.

Most of this document is given over to an explanation or an elaboration of these headings, and these elaborations will be given and commented upon in a very abridged fashion in this report. It is not clear whether these subjects have been listed in order of their priority but it is unlikely that the

first two subjects, dealing as they do with the physiology and pathology of the central nervous system, occupy this prominent position by pure chance.

Item 1, *Physiology and pathology of higher nervous activity*. In essence this represents the continued growth of the work and concepts of the late Professor I. P. Pavlov, and the adaptation of his doctrine to problems of physiology and clinical medicine. This Pavlovian philosophy penetrates a number of branches of Soviet medicine today, going far beyond that of neurophysiology per se, into the fields of immunology, endocrinology, clinical medicine, and psychiatry. Within the Soviet Union the influence of Pavlov's work on conditioned reflexes as a basis for human behavior in both normal and psychasthenic patients overshadows that of Freud.

According to the plan the lines along which this research is to proceed are several, and, as with all of these 21 other major subjects, the project is to be directed by one Institute, in this instance the *Institute of Experimental Medicine* in Leningrad, but certain of its aspects are to be farmed out to as many as a dozen or more laboratories or clinics, located in different places.

Particular aspects in which this research is to be pursued are concerned with: the nervous activity of the cerebral cortex, the dynamic localization of functions within the cerebral cortex, and with the attempt to elucidate the mechanism of basic nervous synthesis including the processes of formation of the conditioned reflex. The program will also deal with the pathology of higher nervous activity and is actually a study of those pathological states which can be expected to produce disturbances of higher nervous activity. This calls for the creation in animals, notably monkeys, of various pathological states in the nervous system, and for the elaboration of an experimental policy as to the prophylaxis of these states.

One of the laboratories to which this problem has been assigned is the medical biological station at Sukhumi on the Black Sea (in the Republic of Abkazia). Here a large colony of primates, consisting of monkeys and chimpanzees, is kept and bred under more or less natural conditions and is available for various kinds of experimental work. The production of nervous states, i.e., neuroses, etc., in the monkey has long been part of a program of research at this institute where by the utilization of normal conditioned reflexes the investigators have been able to establish neuroses in these animals, some of which appear to be irreversible.

This work on the pathology of nervous activity also envisions studies on growth and maturation to be correlated with the development of nervous activity in infants, pre-school, and school-age children. It is also to extend to studies on the development of reflex activity in the embryonic and post-natal periods of life, on the formation of individual traits as regards nervous activity, and on the effects of environment on the pattern of higher nervous

activity in children during the first three years of life. Much of this is being done with the idea of determining the degree to which a system of education may alter the situation.

Item 2, listed as *Basic mechanisms of activity of the nervous system*, is the second phase of this project in neurophysiology and neuropathology. The work here deals with the principle of dominance as a working mechanism of the activity of the nervous centers in the normal nervous system. This will concern the processes of inhibition, the physiology and morphology of the vegetative nervous system with particular emphasis on cortico-visceral interrelationships in normal and pathological states: the regulation of circulation, respiration, and digestion.

Item 3 on the list is labelled *Functions of proteins*, their structure and their metabolism. This obviously can take many forms but here again the rôle of the nervous system has received considerable emphasis as a mechanism for the regulation of the activities of various enzymes within the organs or tissues of the body, which may in turn influence the amino-acid composition of individual proteins.

Such emphasis upon the nervous control of bodily functions and body composition indicates with what respect this central nervous control is viewed not only by Soviet physiologists but by biochemists.

4. Research in *Pharmacology* is to continue along the lines which they claim to have been following for the past five years, namely, in the development of theoretical matters and the discovery or chemical synthesis of new pharmaceuticals. Attention is to be paid here to the extraction of active ingredients from plants which grow in the Soviet Union.

5. Under the heading of *Morphology* it is pointed out that the examination of tissue structure had been the center of scientific attention during recent years but the earlier emphasis on structural changes in organs and cells has given way somewhat to the study of their pathological physiology. Nevertheless, the study of structural changes in tissues and cells is not to be neglected and here again neuro-anatomy and neuropathology seem to have a high priority. There is also to be an interest in the pathology of fibrous structures, the pathology of radiation injury, of the infection process, of the cardiovascular system, and of neoplasms. One whole major section is given over to the pathology of occupational diseases; another to that of vascular disease.

6. *Hypertension and arteriosclerosis*. As to work which they consider desirable on the etiology and pathogenesis of hypertension, their primary approach carries with it the intent to clarify the nature of nervous and humoral factors and their rôle in etiology. This will include clinical investi-

gation on the treatment and prophylaxis of hypertension in patients, using new drugs in particular.

Under the heading of arteriosclerosis and coronary artery insufficiency (presumably atherosclerosis in our terminology), efforts are to be directed not only towards the analysis and the rôle of the nervous and humoral factors but of their metabolic features, which are not to be limited solely to disorders in lipoid-fat metabolism. These are aimed essentially toward devising principles for the prophylaxis and treatment of hypertension, arteriosclerosis, and coronary artery insufficiency. There is no apparent mention of the epidemiological approach in this plan, for here, as in other non-infectious diseases, clinical epidemiology does not seem to have been taken up, or at least it is not mentioned as such among the other plans of investigation.

7. Research in *Surgery* calls for work on the lungs, heart, and large blood vessels. There are prominent and ambitious plans here for the development of thoracic surgery, particularly as it is pointed out and stated in the plan that thoracic and cardiac surgery does not hold the place it might, the reason being that facilities do not yet exist in the Soviet Union which will supply the needs of modern surgery for special instruments and equipment, anesthetics, and drugs. The new program calls for improvement in this situation. One of the first requirements is concerned with research on anesthesia; a long list of plans dealing with general and special problems in lung surgery and of surgery of the heart and the great vessels comes next.

8. *Neurosurgery* is another major item. Here is listed: research on problems of trauma, tumors and inflammation of the central nervous system to be coupled with studies on the reaction of the brain to local injury.

9. In the field of *General neurology* work is to be carried out on the pathogenesis, prophylaxis, and treatment of diseases of the central nervous system which includes a variety of brain lesions as well as viral infections, peripheral neuritides, and neuroses.

10. A major heading is devoted to *Malignant neoplasms*, and, considering the number of large institutes wholly devoted to this field, it is surprising that this does not appear earlier on the list. The Soviet pattern of cancer research will follow that to be found in this country. It is an attack over a wide front dealing with viral, chemical, and hormonal theories on the etiology and pathogenesis and therapy of tumors. This ramifies into many fields and is to be carried on in many institutions. The plan includes the prophylaxis of tumors, methods of diagnosis and therapy (chemical, physical, immunological, and hormonal), and even the administrative aspects of organizing the fight against cancer. It reflects a tremendous interest in

the whole subject and the desire of Soviet scientists to be in the forefront of a world-wide attack on cancer.

11. *Tuberculosis* occupies a whole section, reflecting the fact that this disease is still an important cause of illness in the Soviet Union. Research is to be concerned with the prophylaxis, pathogenesis, clinical aspects, and therapy, as well as the epidemiology of tuberculosis and the organization of anti-tuberculosis work.

12. Next comes the *Epidemiology, prophylaxis, and treatment of intestinal infections*, especially dysentery. These enteric diseases apparently continue to be very important causes of illness throughout the Soviet Union. Particular attention is to be paid to the prophylaxis of these disorders, and the creation of new preparations for immunization among which are the so-called polyvalent, high-activity preparations of bacteriophage and a study of its effectiveness. One feature is concerned with "the laws of the dysentery epidemiological process," i.e., the study of factors causing the seasonal rise in dysentery infections and the uneven distribution of infection among age groups; its spread under rural conditions, and the rôle which hygienic measures play in its control.

13. There is a section on *Maternal and child welfare* calling for research on: the handling of cardiovascular disorders during pregnancy, childbirth and the puerperal period, as well as the toxemias of pregnancy, the regulation of labor, and the protection of the newborn, and studies on fertility. One specific project is a critique on the broad scale use of x-ray diagnoses or x-ray therapy in females, notably pregnant females, as to the effect of radiation energy on the ovum, the embryo, and the female organism. It was specifically stated that more effective measures must be developed to avoid radiation disease and to treat it.

14. *Infectious diseases of childhood* come next. Specifically mentioned are scarlet fever, measles, pertussis, and diphtheria. It may be of some interest to note that scarlet fever is listed first, a disease which in many European countries today is of so much less importance than it used to be.

This program is to cover work on the etiology, epidemiology, prophylaxis, and therapy of childhood diseases, which seem to be listed in a certain order of priority. Pertussis receives special attention both from the standpoint of improving methods of diagnosis and the development of vaccines, of which they have various types. The work on scarlet fever calls for the development of an effective method of active immunization with a study of the immunogenic properties of various streptococcal antigens. Noticeable in this first mention of a streptococcal disease is the absence of work dealing with the possible association of rheumatic fever with streptococcal illness.

In the plans for the continued control of diphtheria mention has been made of the fact that active immunization and improvements in therapy have resulted in a sharp drop in illness and death rates due to that infection.\*

Considerations with regard to measles indicate that sero-prophylaxis of this acute infection is widely practised in the Soviet Union, but the plan points out that this method of passive immunization is of limited significance from the standpoint of reducing the total rate of infections. The serum used is mainly convalescent serum, and it is pointed out that this carries another shortcoming because of the possibility of transmission of viral infections such as hepatitis. It is further mentioned that the danger of this complication can be eliminated by the use in measles of gamma globulin, i.e., human serum concentrate. The extent to which gamma globulin is available in the Soviet Union is not stated, but the chances are that the supply is limited. In keeping with the program of control of other infectious diseases work on vaccines to produce active rather than passive immunity is in progress.

15. Another basic program is concerned with *Nutrition* and its physiological basis for healthy and ill persons. This covers work on the prophylactic nutrition of industrial workers and also includes a section on the effects of residual quantities of poisonous chemicals used in agriculture and their bearing on crops exposed to such chemicals when the agricultural product serves as human food.

16. Another whole section illustrates the Soviet interest in *Industrial disease* and in improvements in the control of occupational hazards. Among these occupational diseases are those which affect workers engaged in agricultural pursuits, and those resulting from exposure to dust, industrial intoxications, and radioactive substances which may be used in industry. Particular attention is to be placed on the dynamics of radioactivity in populated places and in industrial installations. Part of this same project is concerned with the effect on the human organism of certain physical factors in his environment. It is pointed out that the increasing use of x-ray techniques, electronics, high-frequency currents, and pneumatic instruments all need further study as to what the possible biological effects on the human organism may be.

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\* Vital statistics on the actual incidence or prevalence of diseases in the Soviet Union are not mentioned in this report or indeed in hardly any of the Soviet medical publications. It is not known whether this information is regarded as secret, or whether the fact that there has not been a general population census in the Soviet Union since 1939 has rendered the compiling of accurate rates on the prevalence of illness so difficult that statistics are simply not available.

The physiology of the laborer is to receive consideration, i.e., processes of adaptation required for men who work in conditions under which they are exposed to high-level noise, vibrations, ultra-high-frequency radiations, and radioactive isotopes. These are studies designed to improve the capacity of the human body to work and to maintain health at a high level under conditions which tend to give rise to stress. Included in the program is sanitation of the air with attention being paid to the effects of industrial wastes, or harmful substances in the atmosphere, of ionizing radiations in the atmosphere of large cities and industrial centers and the penetration of the organism by aerosols. This is directed towards the production of methods for the deactivation of gaseous wastes and the protection of the water supply. Housing and lighting are also included in this program.

17. Another section could be termed *Population research*. It deals with the acclimatization of populations within the newly colonized regions of the USSR reflecting the fact that mass migrations have been carried out.

18. The subject of *Microbial variation* is given a whole heading, indicating its importance in biology and medicine. At first glance this can be considered basic research indeed. It deals with the laboratory production of new species or subspecies, or subtypes of microorganisms, bacteria, and viruses, and the possible relation of such changes to what they call the epidemic process. This form of research is not only concerned with methods of producing variation or mutants but deals with the action of drugs on microbes and drug resistance. It is also being oriented towards the production of nonvirulent variants which might be useful in vaccines. This is particularly important because Soviet medicine uses live, attenuated bacterial and virus vaccines on man more extensively than is the situation in this country.

19. *Viral infections* occupy another whole division. The plans, which occupy at least seven pages of the report, deal with etiology, epidemiology, and immunology, and in the opening statement the reader is reminded that Soviet scholars have already opened up the field of a number of new infectious diseases such as hemorrhagic fever (of which there are several varieties) and "two wave" meningo-encephalitis which is apparently a variant form of Russian spring-summer encephalitis. The number of other vital diseases to be investigated are many, but not the least member is viral hepatitis, known by them under the name of Botkin's disease. Others to receive special attention will be measles, rabies, trachoma, and in particular influenza. Research upon influenza represents a development which has been going on for many years in the Soviet Union. It is concerned with experimental influenza in animals, variations in influenza viruses, improve-



ments in clinical diagnosis, vaccine production, and studies on the basic defense mechanisms of influenza, as well as its epidemiology in man.

20. *Antibiotics* and synthetic chemotherapeutic agents for use in therapy occupy a whole section. None of the antibiotics which they have developed is actually designated by name in this review, although the Russians have developed at least one of these which is being used in that country along with others developed in East Germany. In the planning for extensive work in this field many institutes are named as collaborating agencies. Included among the bold objectives is the discovery or the development of antibiotics for the treatment of virus diseases, such as influenza, poliomyelitis, hepatitis, and measles.

21. *Epidemic poliomyelitis* occupies a whole section. This is surprising because that disease has not been particularly common in the Soviet Union or at least recognized as being common. It would seem that the importance of poliomyelitis in other parts of the world has spurred Soviet medical scientists into special action in this field.

First on the list of desiderata for them is the development of a specific vaccine for the prophylaxis of poliomyelitis, i.e., the mass production of a vaccine of the Salk type, and the study of the various strains of polioviruses to be incorporated into their formalinized vaccine. Nothing is mentioned about the use of live, attenuated virus vaccines in this disease. The plan also calls for improvements in the laboratory diagnosis of poliomyelitis and the study of its epidemiology. Clinical investigations which include work on the after-care are also contemplated. Notable for its absence is any mention of research in the development of mechanical aids for those patients with respiratory paralysis.

22. The final section is given to *Pediatrics*, with individual sections on child hygiene, nutrition, childhood infections, and blood dyscrasias. Here for the first time rheumatic fever is mentioned. It is planned to study: the pathogenesis of rheumatic fever, the rôle of chronic tonsillitis and the latent clinical forms. For the therapy of active rheumatic fever clinical studies are planned on the synthetic preparation of drugs (butadione) and steroid hormones (ACTH) and cortisone. For the prevention of rheumatic fever scientific research is advised to improve methods of combatting focal infections, to evaluate the use of anti-rheumatic chambers, and the rôle of forest schools. It would seem that the concept of Group A hemolytic streptococcal infections playing an etiologic rôle in rheumatic fever, if recognized, is at least not mentioned in these plans.

*Critique.* In summary, then, it would appear that an over-all plan of this kind, so extensive and so ambitious, covering as it does basic and applied

work in the whole field of medical sciences is a phenomenon in itself. If comparisons are to be sought, it would perhaps be better to compare this program with one which might be evolved within European countries as opposed to one from the United States. For within Scandinavian countries, Germany, France, and Italy a national policy for medical research to be carried out in one or more government institutions is more familiar than it is in this country. In other words, although the general pattern of this type of approach may be less familiar to us than it would be elsewhere, this should not detract from our judgment of its merits or demerits.

As to the calibre or stature of the proposed research program the reviewer is certainly incompetent to make a blanket estimate considering the variety of different subjects involved, covering as they do medicine, surgery, pediatrics, hygiene, and preventive medicine as well as most of the so-called basic medical sciences of physiology, pharmacology, microbiology, etc. Some of the proposed research appears to be almost ultramodern; some could be regarded as outmoded. This is not an excuse to look down one's nose, for the reviewer is reminded of the fact that brilliant discoveries (in contrast to developmental researches) are seldom made in fashionable fields.

Some of these research programs which are to be pursued by Soviet scientists during the next five years reflect an advanced and logical stage of development in disciplines in which they have already had long and valuable experience. Particularly is this true of the field of neurophysiology. Pavlov's mantle has fallen on the shoulders of a number of his disciples and the adaptation of his techniques and philosophy to neurophysiology and to psychology is still given a high priority by Soviet medical science. This concept also penetrates into five or six of the 22 main subjects to be investigated.

The experimental work in virology and its accompanying epidemiological survey plan, particularly that concerned with influenza and with the Russian spring-summer viral encephalitides, is timely and by no means inferior to some of that going on in Europe and the United States today.

On the other hand, there are noticeable gaps to which one can easily point, such as a dearth of plans calling for the use of tissue culture as a means of propagating a variety of viruses. Apparently this method, which has so revolutionized virology in the United States, England, and certain European countries, has only just begun to be appreciated in Russia.

As to what might be called other omissions—subjects which might appear if, for instance, a program of this kind had been drawn up in the United States in 1956—the reviewer is on shaky ground, for it is clear that interpretations of first things first would differ in different lands. The rarity of research work on rheumatic fever in the Soviet plan is, however, worth mentioning. Perhaps this is because Soviet physicians are not at all agreed

as to the pathogenesis of this disease. Their mention of the use of "forest schools" as a prophylactic measure against rheumatic fever would seem to reflect an approach which could be regarded here as outmoded. Endocrinology and geriatrics do not seem to receive much attention as major subjects of research. The rather limited use by the Soviets of the epidemiological approach to noninfectious diseases such as heart disease and cancer, which is only just beginning in the United States, might be mentioned here because actually it is the kind of research that could be more readily carried out in Soviet Russia than in many other places. One might also say that the whole variegated field of "intramural clinical investigation," i.e., the intensive study of sick patients, which is today so characteristic in this country of full-time medicine, figures only slightly in the Soviet Plan. This an approach which requires highly organized hospital staffs consisting of residents, internes, and Fellows who work on the wards and in laboratories within the hospital. This type of personnel and these facilities are not generally existent as such in major Soviet hospitals.

Part of this program of research has been obviously prepared to indicate that Soviet Medicine and Soviet Medical Research are not behind the times and are not to be caught napping. The heavy emphasis upon the use of radioactive material and of isotopes in research, of the dangers from exposure to radioactive substances, all suggest an awareness of the value, dangers, and newness of the atomic age.

Another feature, which is thoroughly genuine, is their emphasis on preventive as compared with curative medicine. Prophylactic measures occupy a prominent position throughout many of these plans. This is reflected by their extensive plans for: research on the control of communicable disease, the protection of populations against radioactive materials, and the emphasis, as is natural in the Soviet Union, on industrial hygiene and the protection of the laborer. Child welfare also stands out prominently among the lists as an important aspect of preventive medicine.

Soviet scientists are well aware that scientists in the United States tend to regard certain aspects of Soviet biological as well as medical science as flimsy. This stems from the severe down-grading which Soviet science received some years ago from doctrines promulgated by men such as Lysenko in the field of genetics. In Lysenko's case, a government order backed up a personal and, to say the least, a controversial opinion which was all too reminiscent of Hitler's arbitrary decrees about scientific thoughts. This episode occurred about ten years ago. Today in Russian scientific circles Lysenko is not a happy subject of conversation. Official scientific doctrines established by decree no longer seem to be the fashion,

and widespread differences of opinion are far more openly expressed among medical scientists than was apparently previously admitted.

One of the questions frequently asked of those who have recently observed medical research in the Soviet Union is whether or not there is any chance for individual effort and initiative to express itself within the framework of their totalitarian system and long-term plans such as this one. Soviet medical authorities go to some length to reassure visitors from outside countries that there *is* room for individual initiative and talent, in spite of their profound deference to plans. As an example, it is frequently stated that a young scientist may often be given the opportunity of developing an idea of his own and may even carry out preliminary experiments on a subject of his own choosing in the laboratory where he happens to be placed. If these experiments are promising, he is allowed to report his results before one of the medical societies or its branches, i.e., the Physiology Section, the Pathology Society, etc. If the work receives favorable comment there and it seems to deserve to be pursued further, an outline for future work in the field is presented to the appropriate committee of the Academy of Medical Sciences or the Research Council of the Ministry of Health. And here again, if it is received favorably, it may be eventually written into a plan of research, such as the one which is here received. Furthermore, individual prizes are given to individuals who have shown originality and brilliance in their scientific work and ideas. This, it is pointed out, is a stimulus for such initiative on the part of a young scientist and is supposed to reflect the fact that *individual achievement* in a field in which the state is interested is in full keeping with what might be termed the Soviet religion.